

Remarks

In view of the above amendments and the following remarks, reconsideration of the outstanding office action is respectfully requested.

The rejection of claim 113 under 35 U.S.C. § 112 (second paragraph) for indefiniteness is respectfully traversed in view of the above amendments.

The rejection of claim 22 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,098,609 to Iruvanti ("Iruvanti") is respectfully traversed.

Iruvanti teaches a paste having a thermally conducting solid filler (preferably in the amount of 60-78 vol %), a nonaqueous electrically resistive liquid carrier, and a stabilizing dispersant. Solid fillers include highly thermally conducting metallic or ceramic (e.g., diamond) fillers. In contrast, claim 22 of the present application is directed to a thermally conductive interface material made of a thermally conductive paste containing *porous agglomerates of carbon black* dispersed in a paste-forming vehicle, where the paste, when compressed between a heat source and a heat sink, forms a thermally conductive interface material.

Iruvanti does not teach a thermally conductive paste containing porous agglomerates of carbon black dispersed in a paste-forming vehicle. However, the U.S. Patent and Trademark Office ("PTO") has taken the position in the outstanding office action that 60-78 vol % solid filler meets the limitation of porous agglomerates of carbon black. Applicant respectfully disagrees.

To begin, the office action provides no basis to support a position that Iruvanti's solid filler (i.e., diamond) meets the limitation of porous agglomerates of carbon black.

In contrast, the present application identifies carbon black and diamond as two different materials and further describes a clear distinction between interface materials of the present invention containing porous agglomerates of carbon black and interface materials containing diamond. In particular, the results shown in Table 2 (page 19) demonstrate that at contact pressures of 0.46 MPa, 0.69 MPa, and 0.92 MPa, conductive pastes containing porous agglomerates of carbon black have conductance values of 18.94 ± 0.60 , 24.87 ± 1.00 , and 25.74 ± 1.20 , respectively, whereas pastes containing diamond have conductance values of 1.15 ± 0.02 , 1.21 ± 0.09 , and 1.54 ± 0.03 , respectively. The superior performance of conductive pastes containing carbon black over those which contain diamond is attributed to

the differences between the two materials; namely, carbon black is porous, thus being spreadable (compressible), whereas diamond is not (page 10, lines 20-27). The porosity of carbon black particles also allows penetration of the vehicle into a carbon black particle, thereby enabling the resulting paste to have high fluidity (page 11, lines 3-10).

Given the distinction taught in the present application between porous agglomerates of carbon black and diamond, and the lack of any countervailing evidence in the office action, applicant submits that Iruvanti's diamond filler does not meet the limitation of porous agglomerates of carbon black. Therefore, it cannot be said that Iruvanti teaches each and every limitation of the claimed invention.

Accordingly, the rejection of claim 22 under 35 U.S.C. § 102(b) as anticipated by Iruvanti is improper and should be withdrawn.

The rejection of claim 22 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,165,612 to Misra ("Misra") is respectfully traversed.

Misra relates to an interface pad or layer for use in combination with solid state electronic components adapted to be interposed along a heat dissipating path between the electronic device and a mounting chassis or heat-sink surface. The interface pads include a polyphenylsulfone binder or matrix blended with a particulate solid such as graphite or diamond. Misra does not teach a thermally conductive paste containing porous agglomerates of carbon black dispersed in a paste-forming vehicle.

However, in the outstanding office action, the PTO asserts that Misra's graphite or diamond fillers form porous agglomerates dispersed in a paste forming vehicle and, therefore, meet the limitations of claim 22. Applicant respectfully disagrees.

The outstanding office action provides no basis upon which to support a position that Misra's graphite or diamond fillers (i) meet the limitation of carbon black and (ii) form porous agglomerates dispersed in a paste forming vehicle.

The present application clearly identifies carbon black and graphite as different materials (the present application also distinguishes carbon black and diamond, as explained *supra*) and further describes a clear distinction between interface materials of the present invention containing porous agglomerates of carbon black and interface materials containing graphite. In particular, the results in Table 2 (page 19) demonstrate that at contact pressures of 0.46 MPa, 0.69 MPa, and 0.92 MPa, conductive pastes containing porous agglomerates of carbon black have conductance values of 18.94 ± 0.60 , 24.87 ± 1.00 , and

25.74 \pm 1.20, respectively, whereas thermal pastes containing graphite have conductance values of 3.03 \pm 0.09, 3.67 \pm 0.08, and 4.02 \pm 0.12, respectively. The superior properties of thermally conductive pastes containing carbon black over thermally conductive pastes containing graphite is attributed to the physical differences between the two materials; namely, carbon black is porous, thus being spreadable (compressible), whereas graphite is not (page 10, lines 20-27). The porosity of carbon black particles also allows penetration of the vehicle into a carbon black particle, thereby enabling the resulting paste to have high fluidity (page 11, lines 3-10).

Thus, even if Misra's graphite and/or diamond particles do form porous agglomerates (which applicant does not admit), Misra still does not teach each and every limitation of the claimed invention, because Misra does not teach porous agglomerates of *carbon black*.

Accordingly, the rejection of claim 22 under 35 U.S.C. § 102(b) as anticipated by Misra is improper and must be withdrawn.

The rejection of claim 22 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 4,842,911, to Fick ("Fick") is respectfully traversed.

Fick teaches a thin composite interface coating consisting primarily of silicone rubber bonded securely to heat sink surfaces. The interface coating is loaded with finely-divided heat-conducting particles (e.g., graphite) to cause it to exhibit significantly better thermal conductivity. Fick does not teach a thermally conductive paste containing porous agglomerates of carbon black dispersed in a paste-forming vehicle. However, the PTO has taken the position in its outstanding office action that the finely-divided heat-conducting graphite particles of Fick form porous agglomerates dispersed in a paste forming vehicle and, therefore, meet the limitations of claim 22.

Applicant respectfully submits that Fick cannot anticipate claim 22 for substantially the same reasons as set forth above with respect to Misra (i.e., graphite particles are not carbon black).

Furthermore, Fick fails to teach a thermally conductive interface material made of a thermally conductive *paste*, as required by claim 22.

Therefore, the rejection of claim 22 under 35 U.S.C. § 102(b) as anticipated by Fick is improper and must be withdrawn.

The rejection of claim 22 under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,947,285 to Chen et al. ("Chen") is respectfully traversed.

Chen does not qualify as a prior art reference, because the August 25, 2003, filing date (and July 1, 2004, publication date) of Chen is after the July 9, 2003, priority filing date of the present application. Therefore, the rejection of claim 22 under 35 U.S.C. § 102(e) as anticipated by Chen is improper and must be withdrawn.

The rejection of claims 111-113 and 124 under 35 U.S.C. § 103(a) for obviousness over Iruvanti, Misra, Fick, or Chen is respectfully traversed.

A proper *prima facie* showing of obviousness requires the PTO to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated the skilled artisan to combine or modify references. See *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the PTO must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. See *Amgen v. Chugai Pharm. Co.*, 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally, the combination of references must teach or suggest each and every limitation of the claimed invention. See *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

Applicant respectfully submits that the PTO has not made a *prima facie* case of obviousness because, as discussed above, Chen does not qualify as a prior art reference and Iruvanti, Misra, and Fick do not teach or suggest a thermally conductive interface material made of a thermally conductive paste containing *porous agglomerates of carbon black* dispersed in a paste-forming vehicle, as required by claim 22. The PTO has provided no basis for a position that Iruvanti, Misra, and Fick teach or suggest the limitation of porous agglomerates of carbon black and, in contrast, the present application teaches that diamond and graphite are not carbon black, let alone porous agglomerates of carbon black. As disclosed in the present application, thermally conductive interface materials of the present invention containing porous agglomerates of carbon black achieve superior properties over materials containing diamond and graphite particles (Table 2, page 19). Such differences in properties can only be attributed to a difference between the materials themselves (i.e., diamond and graphite vs. porous agglomerates of carbon black). Thus, the disclosure of diamond or graphite would not lead a person of ordinary skill in the art to substitute porous

agglomerates of carbon black for these materials. Based on the dissimilarities noted above between these materials, there is no suggestion to select porous agglomerates of carbon black. Therefore, it cannot be said that the combination of references cited in this rejection teach or suggest each and every limitation of the claimed invention, because the cited references do not teach or suggest porous agglomerates of carbon black, as required by claim 22.


In view of the foregoing, applicant submits that the PTO has failed to make a *prima facie* case of obviousness with respect to claim 22. Since claims 111-113 and 124 are dependent upon claim 22 and, therefore, include all the limitations of claim 22, applicant further submits that the PTO has failed to make a *prima facie* case of obviousness with respect to claims 111-113 and 124.

Therefore, the rejection of claims 111-113 and 124 for obviousness over Iruvanti, Misra, Fick, and Chen is improper and must be withdrawn.

In view of the foregoing, applicant submits that this case is in condition for allowance and such allowance is earnestly solicited.

Respectfully submitted,

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